
A grotesque variant of *Silurus asotus* (Teleostei: Siluridae) from Hongshuihe River basin, Guizhou, China

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Abstract

One grotesque catfish specimen was collected in Zhangjiang River (upper reach of a secondary tributary of Hongshuihe River) in Libo County, Guizhou Province, China. This specimen bears surprising character of four dorsal fins, which have not appeared in any other silurid fishes. But other morphological characters, such as two pairs of barbels, lower jaw projecting beyond upper jaw, the first dorsal fin with one un-branched ray and 4 branched rays, mouth cleft shallow, anterior spine margin of pectoral spine prominently serrated, vomerine tooth band continuous across midline, show much similarities with that of *Silurus asotus*. This result supports that this variant originated from *S. asotus* for some special causations. The present study provided description and comparison with *S. asotus*.

Keywords: Variant, *Silurus asotus*, Siluridae, Guizhou, China

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Introduction

In September 1993, a bizarre *Silurus* specimen with four dorsal-fins was collected in the upper reach of a secondary tributary of Hongshuihe River water catchments in Libo County, Guizhou Province, China. Fishes with abnormal body parts are hackneyed in cultivated species, especially for those with long cultivation history. One good example is gold fish, *Carassius auratus*; this species has been cultivated in ponds or aquariums for 800 years since China's Song Dynasty; and different clines have different names for aquarists according to the abnormal degrees of the body parts, such as dorsal fin absent or not, form of the caudal fin, enlargement of the eye, forehead and color pattern.

Fin abnormalities have previously been reported from several fish species and some fin erosions are associated with degraded estuarine or coastal environments

(Venkateswarlu, 1972; Wellings *et al.*, 1976; Sindermann, 1979; Berra and Au, 1981; Murchelano and Ziskowski, 1982; Cross, 1985; Dethlefsen, 1988; Reash and Berra, 1989; Lindesjoo and Thulin, 1990; Wiklund and Bylund, 1996). But up to now, feral or cultivated *Silurus* species with four dorsal fins (three extra dorsal fins compared with the normal ones) has never been described or reported before. Here we provide description of the variant and compare it with *S. asotus*, which occurs in China widely.

The Zhujiang River (Pearl River) is a complicate river system in south China; it is constituted by three rivers, namely, the Dongjiang River, the Beijiang River and the Xijiang River. The Xijiang River is the largest one and has different names in different sections (Fig. 1). The Hongshuihe River is the middle reach of the Xijiang River.

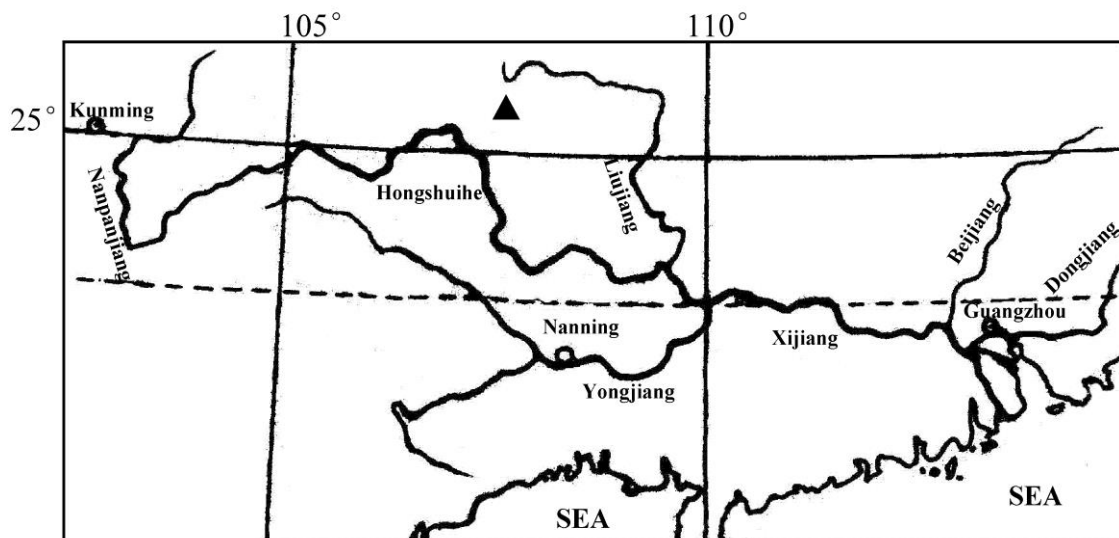


Figure 1: The collection site of the grotesque variant of *Silurus asotus* (▲) in Zhujiang River drainage.

Materials and methods

Measurements were made point to point with digital calipers and data were recorded to tenths of a millimeter. Counts and measurements were made on the left side of the specimen. Measurements of subunits of the head are expressed as proportions of head length (HL). Head length and measurements of body parts are presented as proportions of standard length (SL). Methods of taking counts and measurements followed Chu *et al.* (1999). A single 129.2 mm total length specimen of *S. asotus* (Gender unknown) was collected using gill-net in the Zhangjiang River, in Libo County (25°24.513' N, 107°51.703' E; altitude: 403m) (Fig. 1). This river flows into the Liujiang River, which is influent into the Hongshuihe River in the center of Guangxi Zhuang Autonomous Region, P. R. China. The voucher specimen (YNU 199309001) was deposited in the collection room of the Yunnan University (YNU).

Results

Description

Lateral view of the variant of *S. asotus* is shown in Fig. 2 and Fig. 3. Measurements and proportional measurements are shown in Table 1. Head was depressed, and head length was greater than head depth. Dorsal and ventral profiles were slightly convex. The snout was obtuse. Eyes were round, and located entirely in upper dorsal half of the head.

Mouth was sub superior. Mouth cleft was shallow, extending backward to anterior margin of eyes. Lower jaw was projecting beyond the upper one (Fig. 2). Oral teeth were small and villiform, in

irregular rows on all tooth-bearing surfaces. Premaxillary tooth band was arched, a little narrower at midline, narrowing slightly laterally and then tapering to a sharp point posterolaterally. Dentary tooth band was arched, a little narrower at midline, of equal width to premaxillary tooth band, narrowing slightly laterally and then tapering to a sharp point posterolaterally. Vomerine tooth band was continuous across midline, slightly narrower at midline, arched along anterior margin, not extending posteriorly past level of premaxillary band; band width narrower than premaxillary and dentary band at midline, narrowing slightly laterally and then tapering to a point posterolaterally. Barbels were in two pairs. Maxillary barbel was slender, extending backward to vertical of the pelvic-fin origin, greatly surpassing the pectoral fin. Mandibular-barbel was slender, shorter than maxillary barbel and extending backward to the middle of the operculum. Body was compressed anterior to the anal fin, and greatly compressed posteriorly. Dorsal profile was rising evenly from tip of the snout to the anterior of the first dorsal fin and flattening to caudal peduncle; ventral profile was convex in abdomen and then almost flattening along the anal-fin base backward up-obliquely to caudal peduncle. Skin was smooth. Lateral line was complete and midlaterally in position.

Four dorsal fins were without spine along the back: i, 4 rays were observed in the first dorsal fin; ii, 3 rays in the second dorsal fin; iii, 5 rays in the third dorsal fin; iv, 2 rays in the fourth dorsal fin. Origin of the first dorsal fin was anterior to vertical of the origin of the pelvic fin, while origin

of the second dorsal fin was posterior to vertical of the origin of the anal fin (Fig. 2). Pectoral fin was with a stout spine, sharply pointed at tip, and 14 branched rays. Anterior spine margin was with 7 serrations along the entire length, posterior spine smooth. Pectoral fin margin was convex posteriorly. Pectoral fin was not extending backward to the origin of pelvic fin, surpassing vertical of the first dorsal fin origin. Pelvic fin was with: i, 12 rays and convex margin; ii, tip of the pelvic fin

was surpassing the origin of the anal fin; iii, anus and urogenital openings were located immediately behind pelvic fin base and immediately in front of anal fin base. There was no adipose fin. Anal fin base was long, with a concave in the middle of the base. Anal fin was continuous with caudal fin. Caudal fin was shallowly concave, with i, 14, i principle rays; both lobes were round, upper lobe slightly longer than lower one.

Table 1: Morphometric measurements of the variant of *Silurus asotus*.

Character	Measurement (mm)	
Total length	129.2	
Standard length (SL)	116.7	
Head length (HL)	24.2	20.7% in SL
Predorsal length 1	39.3	33.7% in SL
Predorsal length 2	54.4	46.6% in SL
Predorsal length 3	75.2	64.4% in SL
Predorsal length 4	100.7	86.3% in SL
Prepelvic length	44.2	37.9% in SL
Preanal length	51.4	44.0% in SL
Caudal peduncle depth	5.0	4.3% in SL
Body depth at first dorsal fin origin	20.2	17.3% in SL
Snout length	7.9	32.6% in HL
Interorbital width	12.7	52.5% in HL
Eye diameter	2.4	9.9% in HL
Pectoral fin length	14.4	
Pelvic fin length	10.9	
Distance from pectoral fin to pelvic fin origin	20.0	
Maxillary barbel length	39.5	
Mandibular barbel length	14.4	



Figure 2: Lateral view of the variant of *Silurus asotus*.

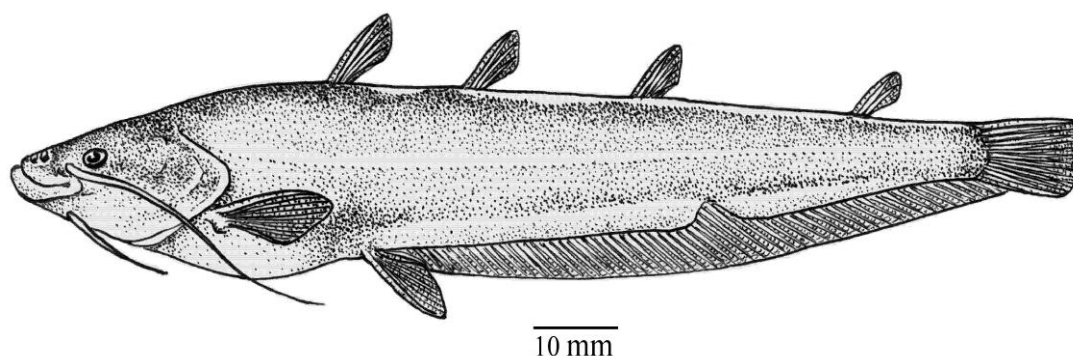


Figure 3: Illustration of the variant of *Silurus asotus*.

Coloration in preservation

Body was a little brown on dorsal of the body, and fading to slightly yellowish on the ventral body. Pectoral fin, pelvic fin, anal fin and caudal fin were palely yellowish.

Discussion

The existence of this variant in nature is rather surprising for the characters of four dorsal-fins along the back (Fig. 2). At first, we thought this specimen may represent a new genus or species, but with more characters were studied and analyzed, this point of view was changed. Although this specimen bears the unique character of four dorsal-fins along the back, the other characters show that this specimen can be designated to *S. asotus* according to the key of the genus *Silurus* (Chu *et al.*, 1999). These characters are: (1) two pairs of barbels; (2) lower jaw projecting beyond upper jaw; (3) the first dorsal fin with 4 rays; (4) mouth cleft was shallow, extending vertical to the anterior rim of eyes; (5) anterior spine margin of pectoral spine was prominently serrated with 7 serrations along the entire length; (6) vomerine tooth band was continuous

across midline.

As to hybrids, many authors (e.g. Hubbs, 1955; Holcik and Dewit, 1962; Banister, 1972; Holcik, 1977; Crivelli and Dupont, 1987; Economidis and Sinis, 1988; Demarais *et al.*, 1992) have illustrated that the intermediacy is a very significant distinguishing character of hybridization. To this specimen, the most showcasing and distinguishing character was its four dorsal fins along its back. By now, we cannot find any *Silurus* species with such characters, so it is unlikely that we can find its putative parent two species where this variant individual occurs, to be able to certify that these individuals being hybrids. Additionally, there is only one specimen collected; and even the fishers residing beside the Zhangjiang River have not seen this kind of grotesque fish before. Based on the aforementioned characters and the present status, we primarily think that this specimen may represent a variant of *S. asotus*. Although we can not prove directly that this specimen is a variant of *S. asotus* by observation on its development from a zygote, the count and proportional characters of the specimen are identical with that of *S. asotus* except the four-

dorsal-fin (vs. one dorsal-fin) and the longer maxillary barbel (maxillary barbel extending backward to vertical of the pelvic-fin origin, greatly surpassing the petoral-fin vs. maxillary attaining the middle of the petoral-fin). This shows a peculiar relationship between the specimen and the individuals of *S. asotus* exists. Furthermore, individuals of *S. asotus* species co-occurs commonly in the Zhangjiang River with the studied specimen.

The causation for this grotesque variant is still a mystery. Although water pollution is widely present in city areas along with fast economic development throughout China, but water of the collecting locality, the Zhangjiang River in the Libo County, is clear and there was no sign of pollution. A variant of *Puntius amphibian* with an extra pectoral fin have also been reported previously (Venkateswarlu, 1972). Probably, this is the first record of variant with three extra dorsal fins in fishes. *Silurus asotus* is widely occurring in Zhujiang (Pearl River), Changjiang River (Yangtze River), Huanghe River (Yellow River) and Heilongjiang River (Chu *et al.*, 1999). This distribution pattern shows its higher adaptive ability, but no relationship with the occurrence of the present special variant. Because of the rarity and no anatomy, the sex of the specimen could not be determined. Whether this variant was fertile or not is also a question. If living individuals could be accessed and studied, the exciting secrets about their coming into being, development, environmental causation, reproduction, more knowledge of relationship to *S. asotus* would be revealed and may give much useful hints

for breeding and aquaculture practices.

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